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A COLUMBITE CRYSTAL FROM BOOTHWYN, PENNSYLVANIA

ISABEL F. SMITH

Bryn Mawr College

The association of columbite is with granitic, pegmatitic, and metamorphic rocks, and its occurrence is to be expected in southeastern Pennsylvania, where such rocks are well developed. The following localities have, in fact, been noted in this region:[1] In Delaware County: Ridley township, quarry southeast of Avondale, on the east bank of Crum Creek, in granite gneiss; Springfield Township, quarry ½ km. (⅜ mile) northwest of Morton Station, also in granite gneiss; Middletown township, two localities, in pegmatite (exact locations not recorded); Middletown Township, Mineral Hill, 2 km. (1¼ miles) west of Media, between Ridley Creek and Black Horse, in pegmatite; and Upper Chichester Township, about 0.8 km. (½ mile) southwest of Boothwyn station, in pegmatite. In Chester County: London Britain Township, 1.6 km. (1 mile) southeast of Landenberg, east of the East Branch of White Clay Creek, where the country rock is crystalline limestone, but the matrix of the columbite uncertain. In Philadelphia County (City of Philadelphia): southwest corner of Broad Street and Olney Avenue, in pegmatite.

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[1] Genth, F. A., Mineralogy of Pennsylvania, *2d Geol. Survey Pa., Rept.* **B**, 137 (1874), 1875.

Lewis, H. C., On two new localities of columbite, *Proc. Acad. Nat. Sci. Phila.*, **1882**, 51.

Genth, F. A., On two minerals from Delaware County, Pa., *Proc. Acad. Nat. Sci. Phila.*, **1889**, 50–52.

Rand, T. D., Jefferis, W. W., and Cardeza, J. T. M., "Mineral localities of Philadelphia and vicinity. *Proc. Acad. Nat. Sci. Phila.*, **1892**, 200.

Dana, J. D. and E. S., System of Mineralogy, 6th ed., 735, 1892.

Benge, Elmer, and Wherry, Edgar T., Directory of the mineral localities in and around Philadelphia, *Min. Coll.*, **13**, 151, 152, 162, 183, 1906; **14**, 7, 26, 42, 1907; **15**, 56, 1908.

Phila. Min. Club (report by E. S. Law), *Min. Coll.*, **13**, 79, 1906.

Wherry, Edgar T., Radium in Pennsylvania, *Min. Coll.*, **14**, 20, 1907.

Wherry, Edgar T., Radioactive minerals found in Pennyslvania and their effect on the photographic plate, *J. Franklin Inst.*, **165**, 63, 66, 70, 71, 75–78, 1908.

With the exception of two rather well developed crystals recorded from Mineral Hill,[1] as far as known the specimens obtained at the majority of these localities have not been well crystallized. In the Theodore D. Rand collection, in Bryn Mawr College, however, there is a fine crystal from Boothwyn, Delaware County, which will be described in this paper.

Boothwyn is situated in the southwest corner of the Chester Quadrangle, 7.5 km. (4.7 miles) southwest of the city of Chester, on the Baltimore and Ohio Railroad. The locality from which the crystal was obtained was undoubtedly the pegmatite mass in the gabbro on the west side of Naaman Creek, between the bridge 0.8 km. southwest of Boothwyn and the railroad tracks. Two pits can still be seen at this locality, but they are completely overgrown, and nothing is now obtainable but minute fragments of rare-earth minerals in the feldspar on the dumps.

The crystal is prismatic in habit, approximately 1½ cm. in length, and less than ½ cm. in breadth and thickness. It is black in color, with slight iridescence, and submetallic in luster. The faces are for the most part too dull to give satisfactory results with the reflecting goniometer (altho one measurement of the best prism, *m* (130), was obtained showing its φ to be 39° 34′, which is but 5′ from the usually accepted value for this mineral), so the Goldschmidt two-circle contact goniometer was used for the measurements. Seven forms of frequent occurrence on columbite, as listed in Table 1, were recognized, and in addition the faces of the pyramid *n* (211), especially n_4, were found to be curved toward the position of the dome (201) (a form not definitely present) in such a way as to suggest the presence of a vicinal form which might perhaps have the symbol (412). The faces of this form were, however, too indefinite for measurement, so it can not be regarded as established. The angles of the prominent forms agreed as closely as could be expected in work with the contact goniometer with those given by Professor Goldschmidt in the *Winkeltabellen.* The orientation and lettering used in the figures, (Frontispiece, Fig. 1) are those of Schrauf and of Goldschmidt rather than those of Dana. (*a* and *b* axes interchanged.)

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[1] Lewis, H. C., *place cited*; Genth, F. A., *place cited.*

TABLE 1

Angles of Columbite from Boothwyn, Pa.

Form			Observed		Calculated	
Letter	Symbol		ϕ	ρ	ϕ	ρ
	Gdt.	Mill.				
a	∞0	(100)	89° 40′	90° 00′	90° 00′	90° 00′
b	0∞	(010)	0 00	”	0 00	”
g	∞	(110)	68 00	”	68 05	”
m	∞3	(130)	39 50	”	39 39	”
z	∞5	(150)	27 00	”	26 26	”
u	1	(111)	67 40	43 30	68 05	43 48
n	21	(211)	79 10	61 40	78 37	61 09
*	2½	(412)?	—	—	84 16	60 48

MONAZITE FROM BOOTHWYN, PENNSYLVANIA

EDGAR T. WHERRY

Washington, D. C.

There are but two known occurrences of monazite in Pennsylvania, one near Morgan Station, Delaware County[1] and the other in the quarry near Boothwyn which yielded the columbite described in the preceding paper. The latter occurrence has never been described, but merely mentioned in notes by the writer.[2] The present seems an opportune time to publish some data on this occurrence.

Some years ago, while looking thru various old collections of Pennsylvania minerals, especially the Theodore D. Rand collection, at Bryn Mawr College, and private collections of several mineralogists of Delaware County, the writer found included therein, under the name of "sphene" (titanite), some more or less transparent brown crystals, from 1 to 3 cm. in length, labeled as found in the quarry southwest of Boothwyn. These were seen at once to be erroneously identified (altho there were true titanite crystals from the same locality included in the collections), and measurement of their angles with a contact goniometer demonstrated their real character. Who was responsible for the mistaken identification is not certain, but it was probably Dr. J. T. M. Cardeza, an amateur mineralogist who collected extensively in that region some 50 years ago. Good specimens are now on exhibition in the Academy of Natural Sciences in Philadelphia.

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[1] Hamilton, S. H., Monazite in Delaware County, Pa. (Report of discovery by J. Glanding Dailey). *Proc. Acad. Nat. Sci. Phila.*, **1899**, 377–378.

[2] In the following publications: Directory of the mineral localities in and around Philadelphia (by Elmer Benge and E. T. W.), *Min. Coll.*, **14**, 7, 1907; Radium in Pennsylvania. *Min. Coll.*, **14**, 20, 1907; Philadelphia Mineralogical Club (minutes), *Min. Coll.*, **14**, 45, 1907; and Radioactive minerals found in Pennsylvania and their effect on the photographic plate," *J. Franklin Inst.*, **165**, 67, 70, 71, and 77, 1908.

The habit of the crystals is prismatic to tabular on the front (ortho) pinacoid. The dominant termination is a front (ortho) dome, which makes an angle of 54° with the pinacoid *a* (100) and is therefore *x* ($\bar{1}01$). The prism shows a φ angle of 47°, both angles being characteristic of monazite. Minute faces of the following additional forms are often present: side (clino) pinacoid *b* (010), side (clino) dome *e* (011), pyramid *v* ($\bar{1}11$), and positive front (ortho) dome *w* (101). Some of the crystals are twinned, according to the usual law for this mineral, on the front pinacoid *a* (100). As these monazite crystals are of unusual size and quality, it seems worth while to publish a drawing showing their average development, which is placed on the frontispiece along with the columbite crystal from the same locality (Fig. 2).

A NEW OCCURRENCE OF RHODONITE

WILBUR G. FOYE
Wesleyan University

The granite pegmatites of Connecticut have yielded a large number of interesting minerals in the past. The feldspar quarries of Branchville and Haddam Neck have been most productive, but other quarries in the vicinity of Middletown and Portland—especially the Strickland quarry, Collins Hill, Portland— have produced a goodly number of specimens. Professor William North Rice[1] has listed the minerals from Middletown and vicinity as follows: Sphalerite, magnetite, gahnite, chrysoberyl, bismutite, orthoclase (crystals), albite, oligoclase, beryl, iolite, garnet, epidote, tourmaline, muscovite (crystals), lepidolite, biotite, columbite, samarskite, monazite, triplite, torbernite, autunite, uraninite. Manganese occurs in the pegmatites usually as a phosphate or columbate-tantalate compound, but the silicate, rhodonite, has not appeared, as far as known, in any of the Connecticut pegmatites, until recently.

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[1] Rice and Gregory, Manual of the Geology of Connecticut. *Ct. Geol. Nat. Hist. Survey, Bull.* 6, 73; Professor Rice has recently added molybdenite and zircon to this list.

In working a narrow dike near the entrance to his quarry, Mr. F. E. Strickland came upon a pocket lined with the usual albite and lepidolite. The massive background behind the loose filling of the pocket was composed of a pink mineral which was at first thought to be a peculiar type of feldspar. Mr. Strickland saved a few bits from the wall of the pocket and gave them to Professor Rice and the writer during a recent visit. Details of the occurrence, other than those already stated, cannot be given, as the pocket was destroyed before our arrival.

The specimen, which is now on exhibition in the museum of Wesleyan University, shows massive rhodonite intergrown with albite and lepidolite. There is a sharp line of demarcation between these massive minerals and the tabular crystals of albite radiating into the pocket opening. Occasionally quartz, with small plates of columbite intergrown, forms a base from which the albite crystals radiate. Towards the junction the rhodonite is stained a light blue to lavender color by decomposition products.

The wonder is that with the large amount of silica present in the pegmatites, other compounds of manganese are more common than the silicate. It may be that the small dike branching from the main body of the Collins Hill mass did not have as abundant a supply of pneumatolytic agents, and that, as a result, conditions were present under which the silicate was stable.

We learn from the *Journal of Industrial and Engineering Chemistry* that the Louisiana-Texas Quicksilver Company has purchased a large tract in the Terlingua district, Texas, and is about to begin extensive development operations. It will be recalled that when this district was first discovered a number of unusual minerals were obtained, but that the bulk of these was lost to science by their being worked up for their mercury content, whereas their sale as mineral specimens would have brought a far greater return to the miners. We hope that collectors who can get to the region will this time keep watch, and rescue from the furnace an adequate quantity for full scientific study of any rare minerals that may be found.

HEMATITE AND RUTILE FORMED BY THE ACTION OF CHLORINE AT HIGH TEMPERATURES

H. E. MERWIN AND J. C. HOSTETTER

Geophysical Laboratory, Carnegie Institution of Washington

The crystals described in this note were formed in the course of some experiments on the volatilization of iron from clay pots used for the melting of optical glass. In order to reduce the amount of iron introduced by solution of the pot walls, experiments[1] were made on the removal or iron from the pot itself by the action of chlorine at the temperature of the pot arch (1000 to 1100° C.). Chlorine was led into the suitably covered pot for several hours. In some preliminary experiments the pot was removed from the furnace immediately after the chlorine treatment and a deposit of crystals of hematite was found on the outer upper portion of the pot, where the effluent chlorine and ferric chloride vapor had come into contact with the products of combustion, which filled the (gas-fired) furnace. On the inside of one of these pots minute glittering crystals were found which subsequently were identified by chemical, optical, and crystallographic characters as rutile, one form of titanium dioxide.

The hematite crystals, which had a maximum diameter of 4 mm., were tabular parallel to the base. The rhombohedron, $r\{10\bar{1}1\}$, and the diagonal pyramid, $n\ \{22\bar{4}3\}$, were also present on all the crystals. Most of the faces on three crystals measured were very perfect. Variations of only 2′ from the mean were found in readings $c: r$ and $c: n$, the average values of which were 57° 37′ and 61°13′ respectively. These are the values accepted by Dana for natural crystals. The magnetic properties of the crystals indicate the presence of not more than 0.2 per cent. of ferrous iron.

The formation of hematite from vapor containing ferric chloride has been mentioned many times in the literature.[2] The crystals described are similar to natural hematite, but both natural and artificial have a somewhat variable axial ratio. The effect of ferrous oxide in changing the ratio cannot be determined from the data at hand. Perhaps the largest hematite crystals which have been noted were those formed in iron pipes used in the Deacon process for chlorine. These were mentioned by C. E. Munroe[1] and have recently been analyzed and studied magnetically.[2] They do not, however, have good faces.

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[1] Hostetter, Roberts and Ferguson, *J. Am. Ceram. Soc.*, **2**, 356–372 (1919).

[2] See bibliography previous to 1891, together with notes by Arzruni: *Z. Kryst. Min.*, **18**, 46, 1891. Fearnsides has described crystals which form when the vapors developed in the coking of salty coal meet the atmosphere: *Trans. Engl. Ceram. Soc.*, **17**, 340, 1918. (Discussion).

The rutile crystals were less than 1 mm. long and so thin that they showed the brilliant colors of thin films. The perfection of their outlines and twinning is shown in Fig. 1. The crystals shown at the ends are twinned on *v*, and the other on *e*.

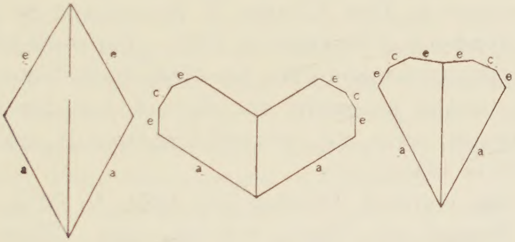

Fig. 1. Rutile formed at 1000° C.

All three crystalline forms of titanium dioxide have been prepared artificially from vapors containing titanium chloride.[3]

It is desirable sometimes to have large, well-developed crystals for research work. The process above described suggests immediately that crystals of hematite and rutile might be grown by the action of water on the vapor of the chlorides of the metals, in a silica glass container maintained at a temperature of 1000° by an electric furnace. Furthermore, it seems feasible to grow crystals of hematite containing ferrous oxide in solid solution. The angles of such crystals would be expected to show interesting variations.

[1] *Am. J. Sci.* [4], **24**, 486, 1907.

[2] Sosman and Hostetter, *Trans. Am. Inst. Min. Eng.*, 58, 409–433, 1917.

[3] Daubrée, *Compt. rend.*, **29**, 227, 1849; Deville and Caron, *Compt. rend.*, **53**, 161, 1861; Hautefeuille and Perry, *Compt. rend.*, **110**, 1038, 1890.

From German journals which have been held in England during the war but are now gradually arriving in this country we learn of the death of Professor Max Bauer, of Bonn, on November 4, 1917.

WILLIAM EARL HIDDEN

GEORGE F. KUNZ

New York City

William Earl Hidden was the son of James Edward, and Abbie Angel Hidden, and was born in Providence, R. I., February 16, 1853. He died, from heart trouble, in Newark, N. J., on June 12, 1918, being thus in his sixty-sixth year at the time of his death. He received his education in the public schools of Providence, New York, and Washington. In 1873–1877 he attended the chemical lectures of Prof. Charles F. Stone; and he joined the New York Academy of Sciences in 1875. For some time he was employed as draughtsman by the American Bank Note Company, and was unusually successful in this art, but his interest in minerals, stamps, coins, etc., weaned him from it, and he finally abandoned it in 1884.

Hidden was married, October 30, 1883, to Miss Josephine Morton of Newark, who died a few years ago. There are three surviving children, Irad Morton Hidden,[1] Morton Earl Hidden, and Miss Abigail Elizabeth Hidden. He was a member of the Rocky Mountain Club, a fellow of the Royal Geological Society of London, and member of the American Numismatic Society and of other organizations.

In 1879, in connection with the recently introduced electric lights, Hidden was sent by Thos. A. Edison on a five-months' search for platinum in the Appalachian belt of North Carolina, South Carolina, Georgia and Alabama. He failed to find any deposits of the metal, but was more successful subsequently in the search for other minerals, having developed, in connection with the Welsbach Light Co. in North Carolina and South Carolina, deposits of the rare thorium mineral monazite.

On the first of his many trips to North Carolina, Hidden made the acquaintance of Mr. J. Adlai D. Stephenson, of Statesville, who had devoted himself ardently for several years to the collection of North Carolina minerals, and who had discovered emeralds at Stony Point, Alexander County, North Carolina. Concerning this discovery Mr. Stephenson states that in 1875 he obtained his first emerald. It was small and rather opaque, but of fine color, and the file-like markings on its planes were very distinct. In the following year he collected two others at the same locality, neither of which quite equalled the first in color, altho one of them was more transparent. During 1877, two emeralds, of good color and quite transparent, were brought to him from a point about 3 km. distant from the first locality.

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[1] Killed in the recent war.

Mr. Stephenson also found, in April, 1879, specimens of a chrome-green mineral which he conjectured to be diopside. Of these he gave Hidden several examples, and the latter sent the supposed diopside for analysis to Dr. J. Lawrence Smith, of Louisville, Kentucky, who determined it to be a variety of spodumene.[1] Unaware that another specimen had previously been sent by Stephenson himself to Norman Spang, the great collector of Pittsburgh, Pennsylvania, Doctor Smith named the new mineral "hiddenite," after William E. Hidden. This led to a heated controversy between Mr. Spang, Mr. Stephenson, and others. As a memorial of the discovery the name of the Post Office Stony Point was changed to Hiddenite.

Later on, the emeralds and the hiddenite were mined, the property having been secured by the newly organized Emerald and Hiddenite Mining Company. Altho the emeralds were not of great gem value, many notable crystals, remarkably interesting as mineralogical specimens, were found, one of them measuring 22 centimeters in length and another weighing as much as 280 grams.[2] The emerald occurrences were described by Hidden before the New York Academy of Sciences in 1882.[3] The two finest crystals are now in the Bement-Morgan Collection in the American Museum of Natural History, New York City. Other examples are in the Garland Collection of Harvard University, the Lea Collection of the United States National Museum, Washington, D. C., the Kunz Collection at Albany, New York, the Field Museum of Natural History, Chicago, etc.

The North Carolina emeralds were remarkable as crystals, and as such are among the finest in the world; but they had the deep emerald hue, the true gem color, on the surface only, and were almost white within. A few very pale gems of 9 carats' weight were cut, but no fine gem of even one carat was ever obtained from the Stony Point material.

(*To be continued*)

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[1] *Am. J. Sci.* [3], **21**, 128, 1881.

[2] These are illustrated in the present writer's "Gems and Precious Stones of North America," Pl. 5.

[3] *Trans. N. Y. Acad. Sci.*, **1882**, 101–105.

AMBER AND ITS ORIGIN

GEORGE F. BLACK

New York Public Library

(*Continued from page 120*)

The microscopical examination of amber shows minute cavities from 1/80 to 1/1000 mm. in diameter, containing either a liquid or a gas, or both in the same cavity. When these cavities are numerous the amber has a cloudy appearance and is then known as "bony amber."

Amber in the form of beads is common in prehistoric burials of the Bronze Age in Great Britain and on the European continent, and hundreds of such beads were found by Schliemann in the tombs excavated by him at Mycenæ (*Mycenæ*, p. 245). In his work on "Tiryns" (p. 372) Schliemann gives an analysis of Mycenæan amber, which shows the following composition:

C, 78.60; H, 10.08; O, 10.98; S, 0.34%

An analysis of Baltic amber by Dr. Otto Helm (*ibid.*) gave:

C, 78.63; H, 10.48; O, 10.47; S, 0.42%.

Dr. Helm has also shown that the amber beads found in prehistoric graves in Upper and Central Italy are of Baltic origin, and not made from the amber found in Sicily and Upper Italy. Sicilian and Apennine amber are devoid of succinic acid.

The name amber comes to us from the Arabic *anbar*, thru the Spanish, but the word referred originally to ambergris, which is an animal substance quite distinct from our amber. True amber in the Orient is sometimes called *karabe*, a Persian word meaning "that which attracts straw." The ancient Greek name, ἤλεκτρον, is applied not only to amber but to an amalgam of gold and silver, and is the origin of our word "electricity." By Roman writers, Pliny and others, amber is called *succinum*, from *succus*, "gum." From this is derived the mineralogical name for amber, succinite, as well as the name of the acid. Tacitus, the Roman historian, says the Æstyans, who gathered the resin on the Baltic coast, called it *glœsum* or *glesum*, a name which has been since transferred to "glass." The Germanic languages possess a common name of their own for amber: German *bernstein* (by metathesis from *brennstein*), Dutch *barnsteen*, Danish and Swedish *bernsten*, all meaning "combustible stone." Danish and Swedish also have another name for the resin, namely Danish *rav*, Swedish *raf*, from the Old Norse name of the substance, *rafr*, a word which stands alone among the older Teutonic languages. Elton, in his *Origins of English history*, p. 61, suggests that this latter name may have some connection with Raunonia, an island mentioned by Timæus (Pliny, *N. H.*, 4, 27) as being one day's journey from the Scythian shore, where the amber was cast up by the waves in the spring season. The Finns and Esthonians call amber *meri-kivi* and *merre-kivvi*, both words meaning "sea-stone."

Amber is thrice mentioned by Homer in the *Odyssey* (iv, 73, xv, 460, xviii, 296), and it is interesting to note that the most important reference (*Od.*, xv., 460) mentions it as an article of commerce in the hands of the Phœnicians. In the Authorized Version of the Bible the Hebrew חַשְׁמַל has been doutfully rendered "amber" in the three passages in Ezekiel in which it occurs (i, 4, 27; viii, 2). The meaning of the Hebrew word has puzzled commentators from Talmudic times to the present day. Delitzsch, the Assyrian scholar, has identified it with the Assyrian *ešmarū*, which was a shining metallic alloy, and this meaning seems best to fit the requirements of the passages in Ezekiel, where something metallic and shining is intended. A high authority, Professor Ridgway, maintains, however, that the word in these passages of Ezekiel really means amber.

NOTES AND NEWS

Professor Alfred C. Lane, of Tufts College, who spent several months teaching mineralogy in the American Expeditionary Forces University at Beaune, France, has returned to the United States.

Professor Lane recently compiled for the publication "Lefax,": "Tables for the recognition of minerals" and "Table for determining common rocks." These are printed on sheets about 10 x 17 cm., arranged for filing with other similar data. The information is greatly condensed, beryl for instance being described thus: 8 **Beryl** 2.7 $Be_3 Al_2 Si_6 O_{18}$ x sq. ended pr. H. 1.579—0.006 Ass. 21. Light green aquamarine, dark emerald, yellow.

Dr. Austin F. Rogers has been promoted from associate professor to professor of mineralogy and petrography at Stanford University.

Mr. J. C. Hostetter has resigned from the Geophysical Laboratory to carry on research work for the Steuben Glass Works, Corning, New York.

Mr. Harry F. Gardner has been appointed mineralogist in the New York State Museum, Albany.

NEW MINERALS

GAVITE

Emilio Repossi: I minerali della Valle della Gava nel "Gruppo di Voltri"; una nuova varieta di talco. (The minerals of the valley of Gava in the "Voltri group"; a new variety of talc.) *Atti Soc. Ital. Sci. Nat.*, **57**, 131-155, 1918.

NAME: From the locality.

PHYSICAL PROPERTIES

Color: milk white, yellowish or greenish, sometimes the color of nickel salts; luster: in mass velvety, but on surfaces of individual blades pearly; structure, thin crusts with mamillary surface, made up of bunches of flakes.

OPTICAL PROPERTIES

Shows aggregate polarization; elongation positive; extinction parallel; interference colors brilliant; refractive indices, by the immersion method, about 1.544 and 1.582, and double refraction thus 0.038. All of these properties are similar to those of talc.

CHEMICAL PROPERTIES

Before the blowpipe infusible; gives tests for Mg and SiO_2; rather readily soluble in HCl. Analysis gave: SiO_2 59.20, MgO 28.57, Fe_2O_3 3.23, H_2O at 110° 1.45, above 110° 6.61, sum 99.06 per cent. The water seems to come off in two definite stages in the quantities stated. On disregarding the water below 110° and recalculating, this gives: $H_4(Mg, Fe)_4Si_5O_{16}$. It is different from talc in the water content and solubility in acids.

OCCURRENCE

Occurs as a coating on garnet, chlorite, titanite, etc., in crystalline schist.

E. T. W.

ABSTRACTS OF MINERALOGIC LITERATURE

THE MINERALS OF THE VALLEY OF GAVA IN THE VOLTRI GROUP; A NEW VARIETY OF TALC. EMILIO REPOSSI. *Atti Soc. Ital. Sci. Nat.*, **57**, 131–155, 1918.

In addition to gavite, abstracted above, the following minerals are described: Garnet, in dodecahedrons modified by unusual forms, including the cube and the trisoctahedron (332); vesuvianite in small crystals; diopside, hornblende and chlorites, which are characterized optically; titanite in fine crystals of several habits, often rich in forms, with one new one, $(1.1.\overline{11})$ which gives good reflections and is to be regarded as established; apatite in small tabular crystals rich in forms, including the rare prism $(21\overline{3}0)$, with the axial ratio $c = 0.7290$, thus evidently a chlorapatite; pyrite, often altered to limonite; magnetite and ilmenite; and granular calcite. E. T. W.

THE HALOGEN SALTS OF SILVER AT WONDER, NEVADA. J. A. BURGESS. *Econ. Geol.*, **12** (4), 589–593, 1917.

The haloids described are embolite, iodobromite and iodyrite. The odor of the minerals is strong, and quite characteristic of the group. S. G. G.

CONTRIBUTION TO THE MINERALOGY OF BORON, LITHIUM AND THALLIUM IN VOLCANIC EXHALATIONS. Albert Brun. *Bull. soc. franc. min.*, **40**, 107–110, 1917; abstract reprinted by permission from *Chem. Abstr.*, **13** (8), 823–824, 1919.

The salts produced by the eruption of Vesuvius in 1906, consisting of NH_4 (Cl, F), show the flame color and spectrum of boron. The leucite-tephrite rock of Vesuvius contains lithium, and this has also been obtained as LiCl on evaporating a water extract of the scoria of 1906. Thallium occurs in all fumarolic salts, arsenic sulfides, and red scorias of Vesuvius, and has also been detected in the ammonium compounds at Chinyero, Teneriffe, and in red scoria at the Spagnuolo crater, Etna. The thallium occurs in soluble and insoluble compounds, in sulfur, and in unknown compounds. The amounts of these elements are about 1 or 2/4,000. The compounds Tl_2S (and TlCl) should be recognized as minerals of volcanic origin. E. T. W.

THE THIOARSENIDES OF THE BINNENTHAL. Albert Brun. *Bull. soc. franc. min.*, **40**, 110–111, 1917; abstract reprinted by permission from *Chem. Abstr.*, **13** (8), 824, 1919.

Spectroscopic tests made on the thioarsenides from the Binnenthal have shown the presence of thallium in every case, altho no thallium-bearing mineral could be detected as an admixture. This occurrence is analogous to that at Vesuvius. E. T. W.

CRYSTAL DRAWING AND MODELING. John M. Blake. *Am. J. Sci.* [4], **43**, 397–401, 1917.

A method of crystal drawing from projections on the author's plotting sphere, and a machine for making crystal models are described. S. G. G.

A MICROSCOPIC STUDY OF THE SILVER ORES AND THEIR ASSOCIATED MINERALS. F. N. Guild. *Econ. Geol.*, **12** (4), 297–353, 1917.

Data are given of the paragenetic relationships of the silver minerals and their associations. Microchemical tests on fragments secured from the polished surfaces are considered more useful in identifying silver minerals than the etching or tarnishing methods. A table of useful tests is given. S. G. G.

MINERAL NOTES. D. Mawson. *Trans. Proc. Royal Soc. S. Australia*, **40**, 262–266, 1917; abstract reprinted by permission from *Chem. Abstr.*, **13** (8), 824, 1919.

Monazite occurs associated with tourmaline, apatite, cordierite, autunite, torbernite, zeunerite, gummite, and carnotite in a corundum-mica schist between Mounts Pitt and Painter, in the Flinders range; it is apparently the result of the action of gaseous or liquid magmatic solutions on the surrounding rocks. Cordierite, sillimanite, and spinel also occur in the corundum-mica schist of the district. Titanite occurs in large crystals in a gabbro-pegmatite below Mount Gee. Australian occurrences of octahedrite, gypsum, lodestone, and davidite are noted. S. G. G.

CHEMICAL NOTES ON DAVIDITE. W. T. Cooke. *Trans. Proc. Royal Soc. S. Australia,* **40**, 267, 1917.

A fair analysis of "davidite" is given. It contains many of the rare earths, tho no zirconium. On heating to redness, 100 grams of it yield 15 c.c. of helium. [The homogeneity of the material analyzed was not considered. Abstractor.] S. G. G.

A NOTEWORTHY OCCURRENCE OF BIOTITE MICA. Evan R. Stanley. *Trans. Proc. Royal Soc. S. Australia,* **40**, 268–271, 1917.

The black biotite associated with "davidite" when exposed to the atmosphere for a few months becomes coated with carnotite. Analyses are given. S. G. G.

GENESIS OF THE ZINC ORES OF THE EDWARDS DISTRICT, ST. LAWRENCE CO., N. Y. C. H. Smyth, Jr. *N. Y. State Mus. Bull.,* **201**, 40 pp., 1918.

A description of the geology, minerals, and probable genesis of these deposits. The ore is a compact granular aggregate of sulfides, pyrite, sphalerite, and sometimes a little galena, with varying amounts of calcite, diopside, tremolite, phlogopite, serpentine, talc, barite, and occasional films of secondary greenockite. A peculiar mineral occurs in small amount, with a vermicular habit, identical with leverrierite except in its pleochroism. The deposits are classed as of high temperature type, with the sequence: (1) diopside and tremolite, developed by contact metamorphism; (2) pyrite; (3) sphalerite; (4) galena; (5) talc; (6) serpentine. S. G. G.

THE ASSIGNMENT OF CRYSTALS TO SYMMETRY CLASSES. Edgar T. Wherry. *J. Wash. Acad. Sci.,* **8** (14), 480–487, 1918.

It is pointed out that evidence has been accumulated that certain substances are in a sense intermediate between crystal classes, simultaneously possessing some of the attributes of two of them, or showing what has been termed weak hemihedrism. Examples are diamond, sylvite, cuprite, pyrite, barium nitrate, rutile, sulfur, and manganite. It is shown that X-ray study has yielded a partial explanation of these relations, showing in some cases that while the structures as a whole may be of one symmetry class, the structure units may be of another. S. G. G.

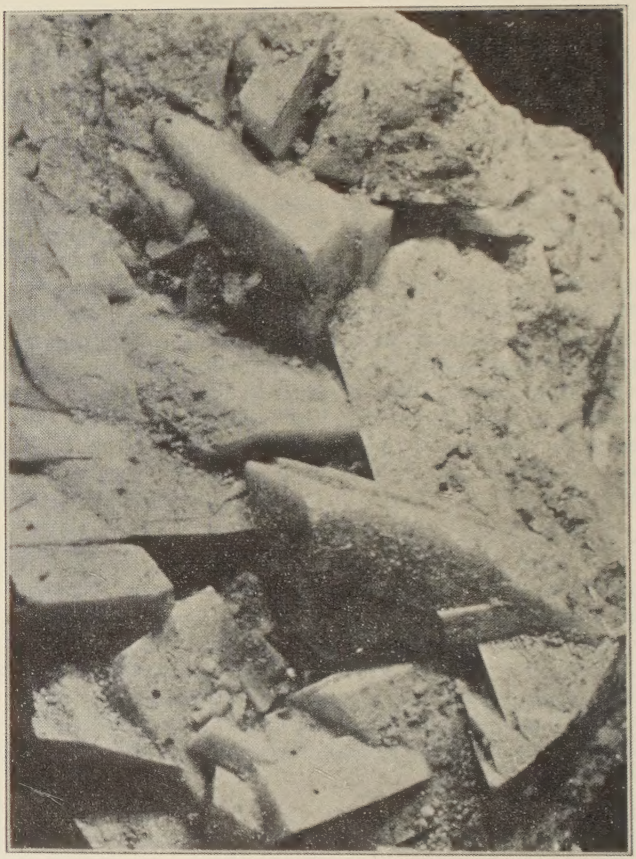
X-RAY ANALYSIS AND THE ASSIGNMENT OF CRYSTALS TO SYMMETRY CLASSES. Alfred E. H. Tutton. *J. Wash. Acad. Sci.,* **9** (4), 94–99, 1919.

The paper above abstracted is criticized, the critic holding that only one symmetry can be possessed by a given structure, and that there are some errors in the interpretation of the relations under discussion. S. G. G.

REPLY TO DR. TUTTON'S DISCUSSION OF THE ASSIGNMENT OF CRYSTALS TO SYMMETRY CLASSES. Edgar T. Wherry. *J. Wash. Acad. Sci.,* **9** (4), 99–102, 1919.

In reply to the above described criticism, it is shown that in order to assign but one symmetry class to each of the substances discussed it is necessary to arbitrarily overlook certain definite observational facts. The writer therefore still feels that a revision of current ideas on this subject is necessary. [Reprints of all three articles may be obtained from this magazine, on request.] S. G. G.

PLATE 15



Colemanite pseudomorphous after inyoite from Death Valley, California